



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,191	03/24/2005	Takahiro Horiguchi	268668US26PCT	4403
22850	7590	09/03/2009		
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER DHINGRA, RAKESH KUMAR	
			ART UNIT	PAPER NUMBER
			1792	
			NOTIFICATION DATE	DELIVERY MODE
			09/03/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary	Application No. 10/529,191	Applicant(s) HORIGUCHI ET AL.	
	Examiner RAKESH K. DHINGRA	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 June 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 11-25 have been considered but are moot in view of the new ground(s) of rejection as explained hereunder.

Applicant has amended claim 11 by adding new limitation like "is mounted on an upper external surface of the transparent case".

Claims 11-25 are now pending and active.

New reference by Ratliff et al (US 2002/0011478) when combined with Shinpei et al and Gurary et al reads on limitations of amended claim 11 including the newly added limitation as indicated above. Accordingly claims 11-15 have been rejected under 35 USC 103 (a) as explained below. Balance claims 16-25 have also been rejected under 35 USC 103 (a) as explained below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinpei et al (JP 09-030893) in view of Gurary et al (US 6,902,623) and Ratliff et al (US 2002/0011478).

Regarding Claim 11: Shinpei et al teach a substrate processing apparatus (Figure 1) comprising:

a processing vessel 10 that defines a processing space therein;
a heating element 14 that heats a substrate introduced into the processing space to a pre-determined temperature;

a transparent case 12 made from quartz that includes a cylindrical portion and a top plate portion for containing the heating element 14;
a heater plate 18 mounted on the top plate portion (upper external surface) of the transparent case 12 (e.g. Fig. 1 and para. 0012, 0014, 0015, 0020).

Shinpei et al teach a substrate supported on the heater plate 18 but do not teach a holding member for holding a substrate at a position spaced from and opposite to the heater plate, and wherein the heater plate is arranged to be slightly separated from the top plate.

However it is known in the art to provide a gap between the substrate and the heater plate (susceptor) in a substrate processing apparatus, as per reference cited hereunder.

Gurary et al teach a substrate processing apparatus comprising a holding member 12 provided with an annular wall 26 so as to hold substrate 10 at a position spaced apart (due to gap 28) from and opposite to a heater plate 14 (e.g. Figs. 1, 2 and col. 1, line 42 to col. 2, line 2).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a holding member that enables a spaced apart relationship between the substrate and the heater plate (susceptor) as taught by Gurary et al in the apparatus of Shipei et al to avoid direct contact between substrate and the susceptor thus minimizing any contamination of substrate by any reaction products adhering to the susceptor.

Shinpei et al in view of Gurary et al do not teach the heater plate is arranged to be slightly separated from the top plate.

However it is known in the art to provide a slight separation between heater plate (susceptor) and top plate of a transparent quartz case as per reference cited hereunder.

Ratliff et al teach a substrate processing apparatus for processing a substrate 28 mounted on a holding member 38, and comprising a transparent case 24 made from quartz (processing tube) that includes a cylindrical portion and a top plate portion. Ratliff et al further teach a heater plate 26 (heating plate) disposed opposite to the holding member 38, and where the heater plate 26 can sit flush with the top plate of the transparent case, or can have an air gap (separation), which provides an increased even thermal distribution (e.g. Figs. 1A, 2A, 2B and para. 0061-0064, 0078 0079) {examiner notes that claim does not clearly recite orientation relationship between the heater plate and the holding member}.

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a separation between the heater plate and the top plate of the transparent case as taught by Ratliff et al in the apparatus of Shippei et al in view of Gurary et al to obtain enhanced even thermal over the wafer surface.

Regarding Claim 12: Shinpei et al teach that apparatus can have a depressurizing part (through exhaust 17) that enables adjusting the pressure in the internal space of transparent case and in the processing vessel to be same (that is, equal pressure in the reactor vessel and transparent case at the same time) [paragraph 0013].

Regarding Claim 13: Shinpei et al teach a reflecting member 16 provided below the heater 14 for upwardly reflecting heat from the heating element (Figure 1 and paragraph 0012).

Regarding Claim 14: Shippei et al teach that reflector 16 (heat reflecting plate) is disposed below an insulating material 15, which in turn is located below heater plate 14, that is reflecting member is clamped in an opposing state to the heater 14 (paragraph 0012).

Regarding Claim 15: Shinpei et al teach the system is a low pressure CVD system wherein process gases are supplied through gas head 2 (gas injection part) for flow of gases into the processing chamber 10. Though Shinpei et al do not explicitly depict an evacuation port in the drawing for evacuating the gas passed through the substrate, the same would be implied (paragraphs 0011 -0013).

Claims 16, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinpei et al (JP 09-030893) in view of) in view of Gurary et al (US 6,902,623) and Ratliff et al (US 2002/0011478) as applied to claims 11-15 and further in view of Fayfield et al (US PG PUB No. 2001/0000098).

Regarding Claim 16: Shinpei et al in view of Gurary et al and Ratliff et al teach all limitations of the claim except a UV source for irradiating UV rays to the processing space.

Fayfield et al teach a substrate processing apparatus (Figure 12) comprising a reaction chamber 10 with a processing space that includes a wafer and a lamp house 14 as UV sources mounted externally (or can be mounted internally also) for heating or for photochemical reaction on the wafer in the processing space (paragraphs 0023-0032).

Therefore it would have been obvious to one of skills in the art at the time of the invention to provide an ultraviolet source for irradiating the processing space as taught by Fayfield et al in the apparatus of Shinpei et al in view of Gurary et al and Ratliff et al to enable treating the wafer for heating or photo-chemical reaction as required as per process (paragraphs 0031).

Regarding Claim 17: Fayfield et al teach that apparatus comprises a UV controller 28 that enables UV source deliver desired amount of power at a UV heating level and the output control can be linked by a feedback system to the chamber temperature (that is area of the processing space to be irradiated by UV rays can be controlled with the help of UV controller 28 (paragraphs 0031, 0032)

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinpei et al (JP 09-030893) in view of Gurary et al (US 6,902,623) and Ratliff et al (US 2002/0011478) as applied to claims 11-15 and further in view of Hattori (US 5,164,012).

Regarding Claim 18: Shinpei et al in view of Gurary et al and Ratliff et al teach all limitations of the claim except a support bridge portion extending across inside of cylindrical portion of transparent case.

Hattori teach a substrate processing apparatus (Figure 2) comprising a quartz reaction tube 35 (quartz case) whose cylindrical portion is supported by a table 23 (column 4, lines 10-35).

Therefore it would have been obvious to one of skills in the art at the time of the invention to provide a support bridge portion extending across inside of cylindrical portion of transparent case as taught by Hattori in the apparatus of Shinpei et al in view of Gurary et al and Ratliff et al to enable support the cylindrical portion of the transparent case.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okase (US 5,884,009) in view of Gurary et al (US 6,902,623) and Ratliff et al (US 2002/0011478).

Regarding Claim 11: Okase teaches a substrate processing apparatus (Figure 1) comprising:
a processing vessel 1 that defines a processing space therein;
a heating element 25 that heats a substrate introduced into the processing space to a pre-determined temperature;

a transparent case 21 made from quartz that includes a cylindrical portion and a top plate portion for containing the heater portion 25;

a holding member 24 with projections 24A for holding a substrate W spaced apart from the holding member 24 (col. 8, line 30 to col. 9, line 15).

Okase does not teach a heater plate mounted on the top plate of the transparent case and at a position spaced from and opposite to the substrate and wherein the heater plate is arranged to be slightly separated from the top plate.

However it is known in the art to provide a heater plate (susceptor) for transmitting heat to a spaced apart substrate.

Gurary et al teach a substrate processing apparatus comprising a holding member 12 provided with an annular wall 26 so as to hold substrate 10 at a position spaced apart (due to gap 28) from and opposite to a heater plate 14 (e.g. Figs. 1, 2 and col. 1, line 42 to col. 2, line 2). It would be obvious to

replace the holding member 24 in Okase's apparatus with the heater plate 14 and holding member 12 of Gurary et al to enable uniform transmission of heat from the heater plate to the holding member.

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a heater plate, as taught by Gurary et al, disposed below the holding member and mounted on the top plate of the transparent case, in the apparatus of Okase to enable uniform transmission of heat from the heater to the holding member.

Okase in view of Gurary et al do not teach the heater plate is arranged to be slightly separated from the top plate.

However it is known in the art to provide a slight separation between heater plate (susceptor) and top plate of a transparent quartz case as per reference cited hereunder.

Ratliff et al teach a substrate processing apparatus for processing a substrate 28 mounted on a holding member 38, and comprising a transparent case 24 made from quartz (processing tube) that includes a cylindrical portion and a top plate portion. Ratliff et al further teach a heater plate 26 (heating plate) disposed opposite to the holding member 38, and where the heater plate 26at can sit flush with the top plate of the transparent case, or can have an air gap (separation), which provides an increased even thermal distribution (e.g. Figs. 1A, 2A, 2B and para. 0061-0064, 0078 0079) {examiner notes that claim does not clearly recite orientation relationship between the heater plate and the holding member}.

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a separation between the heater plate and the top plate of the transparent case as taught by Ratliff et al in the apparatus of Okase in view of Gurary et al to obtain enhanced even thermal over the wafer surface.

Claims 19, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okase et al (US 5,884,009) in view of Gurary et al (US 6,902,623) and Ratliff et al (US 2002/0011478) as applied to claim 11 and further in view of MacLeish et al (US 6,113,984).

Regarding Claim 19: Okase in view of Gurary et al and Ratliff et al teach all limitations of the claim including the holding member provided with an axis 23, but do not teach the holding member comprises a plurality of arm portions configured to support the substrate, and an axis having one end supporting the plural arm portions and another end inserted into the transparent case.

MacLeish et al teach a substrate processing apparatus comprising a substrate holder that includes a plurality of arm portions 118 configured to support a substrate 120 (through holding member 115) and an axis 116 having one end supporting the plural arm portions 118 and another end inserted into a transparent case 102 (e.g. Fig. 14 and col. 13, line 45-65)

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide the holding member having three arm members as taught by MacLeish et al in the apparatus of Okase in view of Gurary et al and Ratliff et al to provide a stable support to the holding member for holding the substrate during processing.

Regarding Claim 20: MacLeish et al teach a rotational drive 121 configured to rotate the axis 116 of the holding member 115 (Fig. 14).

Claims 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okase et al (US 5,884,009) in view of Gurary et al (US 6,902,623) and Ratliff et al (US 2002/0011478) as applied to claim 11 and further in view of MacLeish et al (US 6,113,984) and Callaghan et al (US 6,315,833).

Regarding Claim 21: Okase et al in view of Gurary et al, Ratliff et al and MacLeish et al teach all limitations of the claim (as already explained above under claims 11, 19) including the holding member including a plurality of arms 118 configured to support the substrate and where the plurality of arms extend from an axis 116 (MacLeish et al – Fig. 14).

Okase et al in view of Gurary et al, Ratliff et al and MacLeish et al do not teach the plural arm portions are formed of a transparent quartz and extend horizontally in radial directions from an upper end of the axis.

Callaghan et al teach a substrate processing apparatus comprising a susceptor 120 (heater plate), and an axis 104 from whose upper plural arm portions 112 (made from quartz) extend in radial directions. Though Callaghan et al do not explicitly teach that the plural arm portions 112 extend horizontally, Callaghan et al further teach arms 114 that are movable up and down (enabling that the arms 112 extend horizontally) to hold the substrate (e.g. Fig 3 and col. 5, line 45 to col. 6, line 10).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide the holding member with plural arm portions extend horizontally in radial directions from an upper end of an axis as taught by Callaghan et al in the apparatus of Okase in view of Gurary et al, Ratliff et al and MacLeish et al to provide a stable and precise supporting member for holding the substrate during processing.

Regarding Claims 22, 23: Callaghan et al teach components like arm portions 114, locking collar 160 comprise quartz. Though Callaghan et al do not explicitly teach the axis 104 formed from quartz, it would be obvious to form the axis from quartz in view of its known suitability for usage in plasma chamber components.

In this regard courts have ruled:

The selection of a known material based on its suitability for its intended use is prima facie obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinpei et al (JP 09-030893) in view of Gurary et al (US Patent 6,902,623) and Ratliff et al (US 2002/0011478) as applied to claims 11-15 and further in view of Savas (US 6,331,697).

Regarding Claim 24: Shinpei et al in view of Gurary et al and Ratliff et al teach all limitations of the claim except the heat reflecting member is made from opaque quartz.

Savas teaches a substrate processing apparatus comprising a susceptor 112 for supporting a substrate 104 and an opaque quartz reflector 102 to provide effective reflection of heat towards the substrate (e.g. Fig. 1 and col. 6, lines 50-60).

Therefore it would have been obvious to one of skills in the art at the time of the invention to form the reflector from opaque quartz as taught by Savas in the apparatus of Shinpei et al in view of Gurary et al and Ratliff et al to provide effective reflection of heat towards the susceptor and the substrate.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinpei et al (JP 09-030893) in view of Gurary et al (US Patent 6,902,623) and Ratliff et al (US 2002/0011478) as applied to claims 11-15 and further in view of Futamura et al (US 6,372,048).

Regarding Claim 25: Shinpei et al in view of Gurary et al and Ratliff et al teach all limitations of the claim including that the heater plate 4 is separated from the top plate 8, but do not teach the heater plate is separated from the top plate by a plurality of bosses.

Futamura et al teach a substrate processing apparatus comprising a heater plate 22 that is separated from a support portion 39a (top plate) by a plurality of bosses 64 which enable to minimize transmission of heat back to the support portion (top plate) {e.g. Figs. 9-12 and col. 8, line 40 to col. 9, line 10}.

Therefore it would have been obvious to one of skills in the art at the time of the invention to provide bosses for separating the heater plate from the top plate as taught by Futamura et al in the apparatus of Shinpei et al in view of Gurary et al and Ratliff et al to minimize transmission of heat back to the top plate thus enabling more precise control of heating of the heater plate.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAKESH K. DHINGRA whose telephone number is (571)272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. K. D./
Examiner, Art Unit 1792

/Karla Moore/
Primary Examiner, Art Unit 1792